



2016 Remedial Options Report ***To Address Plume Downgradient of Extraction Wells***

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Prepared for:

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1.0 INTRODUCTION

1.1 Description of the Problem

The Central Wire Union Plant (formerly known as Techalloy) is located in Union, Illinois on the northwest corner of the intersection of Jefferson and Olson Roads. The plant facility and grounds occupy 5 acres. The company owns the surrounding 38 acres including the plant site. See [Figure 1-1](#) for site location.

Central Wire began operating at this facility in 1960 as Techalloy Company, Inc. Prior to 1960, the property was farm land. Techalloy was acquired by Central Wire in 2005. Since 1960 Techalloy, now Central Wire, has been operating as a specialty handler of stainless steel wire products. The finished products are stainless steel wire coils of varying diameters and tensile strengths that are distributed with and without specialty coatings.

In the 1960s and 1970s a part of the process was the cleaning of the stainless steel wire using solvents, primarily trichloroethene (TCE) and trichloroethane (1,1,1-TCA). In those days, when the solvent was no longer useful, it was disposed of on site by pouring the spent solvent on to a concrete slab to evaporate, which was then a generally accepted practice. The source area for the chlorinated groundwater plume that eventually was created is near the east end of the north boiler room which is attached to the northeast corner of the Acid House. The chlorinated (Volatile Organic Chemical or VOC) plume travels with the groundwater which flows in a northwesterly direction.

As result of these activities and after determining there was a chlorinated groundwater plume, Central Wire entered an Order on Consent with the U.S. Environmental Protection Agency to design, build and operate a groundwater extraction and treatment facility to remove the chlorinated solvent plume from the groundwater downgradient (northwest) of the Central Wire facility and to address the source area north of the North Boiler Room.

As part of the Corrective Measures Implementation under the Resource Conservation and Recovery Act (RCRA), Central Wire designed, constructed and is operating a groundwater pump and treat system (P&T) to remove volatile organic compounds from the groundwater including an extraction well (EW-1), a packed tower aerator, piping and a building to house the appurtenant equipment (holding tanks, pumps, meters, electrical systems and the like). Subsequent to the initiation of operations, it was determined that the single extraction well was not capturing the west edge of the chlorinated plume. As a result, Central Wire added a tray aeration system to treat additional groundwater pumped from a new well, extraction well no. 2 (EW-2), located west of EW-1; see [Figure 1-2](#) for location of all wells pertinent to this Status Report. The updated 2016 Geoprobe locations are shown in [Figure 2-1](#).

To operate this facility, Central Wire applied for and received an NPDES discharge permit from the Illinois Environmental Protection Agency (IEPA) to discharge the treated water to the South Branch of the Kishwaukee River. This system has been in continuous operation since 1995 except for minor shutdowns for maintenance and repair.

To address the source area, Central Wire designed and constructed an asphalt cap over the source area. In addition, Central Wire designed, constructed and is operating a soil vapor extraction (SVE) system and an air sparging system. The soil vapor extraction system removes volatile organic compound vapors in the soils above the water table (the vadose zone). The air sparging unit blows air into the soil below the water table and as the fine air bubbles rise to the top of the groundwater table, they strip entrained volatiles from the soil and they enter the vadose zone where they can be captured by the SVE system.

This system has been effective in reducing the contamination in the source area but some contamination still exists since EPA's Maximum Contaminant Limits for some chlorinated compounds are still exceeded in the RCRA Groundwater Monitoring Well Network (see [Figure 1-2](#)). The chlorinated plume extends downgradient from the source area about 1.5 miles and is about 1,350 feet wide.

Overall, between source reduction and groundwater extraction and treatment, the levels of chlorinated solvents detected in the groundwater have gone down on site and have degraded into daughter products that are more typically seen in the extraction wells, downgradient well DGW-1 and at the Geoprobe locations. These daughter products include 1,1-dichloroethene (DCE), 1,1-dichloroethane and vinyl chloride. As an example, vinyl chloride (VC) was first detected in DGW-1D in June 2013 and by the December 2013 sampling it had increased showing that the degradation cycle is nearing completion primarily through reductive dechlorination. VC decreased after December 2013 and was not present in the June 2016 sampling event.

1.2 Current Situation

Central Wire has been investigating the leading edge of the chlorinated plume that is downgradient from the extraction wells on almost an annual basis since 2007. In 2007 Central Wire was concerned that the two high capacity pumps (1,250 gallon per minute capacity) downgradient from the chlorinated plume could be pulling the plume forward at an unnatural rate. These are the irrigation wells at Ex. 6 Personal Privacy (PP) located 2,400 and 4,880 feet downgradient. In Central Wire's opinion, that does not appear to be the case.

Up to 2012, the plume seemed relatively stable and not moving downgradient. Since 2012 the leading edge of the chlorinated plume has advanced about 460 feet. The leading edge of the plume is now approximately 530 feet from the closest well, the Ex. 6 Personal Privacy (PP) well, see [Figure 2-1](#).

In 2007 when this was being discussed by Central Wire and EPA, the thoughts were, that if the plume ever did reach the Ex. 6 Personal Privacy (PP) well or any residential wells, Central Wire would replace them with deeper wells cased into the St. Peter Sandstone. This has been the case in Central Wire's thoughts and discussions since then. In a conference call between EPA and Central Wire on November 1, 2016, it was apparently no longer acceptable for the plume to reach any well.

As a result of the current situation, EPA has asked Central Wire to identify remedial alternatives/options to address the chlorinated plume downgradient from extraction wells EW-1 and EW-2.

The remedial alternatives that will be considered include the following:

- Replace Residential (& **Ex. 6 Personal Privacy (PP)**) Wells as the Chlorinated Plume Approaches/ Impinges by constructing deeper wells cased into the bedrock.
- Construct an extraction well and install a pump to capture the leading edge of the chlorinated plume and construct discharge piping to the South Branch of the Kishwaukee River. This would require an NPDES permit for discharges to the South Branch of the Kishwaukee River.

2.0 REMEDIAL ALTERNATIVES

2.1 Replace Residential (& **Ex. 6 Personal Privacy (PP)**) Wells as the Chlorinated Plume Approaches/Impinges

Central Wire and EPA have been discussing the replacement of the residential wells as the chlorinated plume approaches a well by digging deeper new wells cased into the bedrock since 2007. Recently they have indicated that, for some unexplained reason, this is not a viable option. This is still the preferred option for Central Wire.

The steps that would have to be taken would be to continue to monitor the chlorinated plume. When it is approaching the well site, within 50 or 100 feet, the well would be scheduled for replacement with a deeper well. Central Wire would need approval from the owner of the well including approval for access for drilling the well and to re-hook up the new well to the home or the irrigation system.

Cost

Central Wire is anticipating that only two wells will need to be replaced over time, the two wells on the south side of Illinois Route 176: the **Ex. 6 Personal Privacy (PP)** well and the

Ex. 6 Personal Privacy (PP)

The cost per well is estimated at \$30,000 for a total of \$60,000.

2.2 Construct an Extraction Well at **Ex. 6 Personal Privacy (PP)** Install a Pump to Extract Groundwater at the Leading Edge of the Chlorinated Plume and Construct Discharge Piping

This option would entail at least the following steps:

- Obtain approval from **Ex. 6 Personal Privacy (PP)** to construct an extraction well near the leading edge of the plume.
- Obtain an NPDES permit to discharge to the South Branch of the Kishwaukee River.

- Construct an extraction well, install a 400 gallon per minute pump, extend electrical service and construct discharge piping to the South Branch of the Kishwaukee River.

Central Wire's current NPDES permit provides for limitations on Trichloroethene (TCE), Tetrachloroethene (PCE) and 1,1,1-Trichloroethane (TCA) at 20 µg/L each. These chemicals are not present at the leading edge of the plume. Instead the concentration of VOCs at the leading edge of the plume is primarily 1,1 Dichloroethene (DCE), a degradation product of TCA.

Central Wire has contacted the Illinois EPA (IEPA) to discuss discharge limits on 1,1-Dichloroethene, the primary chemical of concern at the leading edge of the chlorinated plume. They indicated they are guided by Illinois Pollution Control Board (IPCB) regulations which allow IEPA to derive numeric water quality criteria for any substance that does not have a numeric standard in the IPCB regulations, see [Attachment 1](http://eeewww.epa.illinois.gov/topics/water-quality/standards/derived-criteria/index) or <http://eeewww.epa.illinois.gov/topics/water-quality/standards/derived-criteria/index>.

For DCE, IEPA has set a discharge limitation of 110 µg/L. The highest value Central Wire has found throughout the chlorinated plume is 82 µg/L at DGW-1I and at the leading edge of the plume it was found at 9.1 µg/L at GP-29S. The effluent limitation of 110 µg/L will not likely to be exceeded due to pumping the groundwater at 400 gallons per minute, the planned pump capacity.

The width of the plume in the area of pumping is about 800 feet near the leading edge of the plume. In lieu of a complete set of data to determine the plume capture zone, Central Wire has used the Theis distance-drawdown equation to approximate the capture zone. The new well and pump will have an estimated impact over the width of the plume of one foot of drawdown at the edge of the plume after a month of pumping, 1.59 feet after a year of pumping and 2.24 feet after 15 years. The proposed pump would be a variable speed pump, so if needed, and if the well can produce more water, it can be adjusted. See the distance drawdown calculation in [Attachment 2](#).

Cost

This alternative includes the following estimated costs:

• Agreement with Ex. 6 Personal Privacy (PP) to place well, pump & pipeline at Ex. 6 Personal Privacy (PP) including ongoing access for monthly sampling	\$20,000
• NPDES Permit	\$10,000
• Install extraction well and pump plus effluent pipeline including providing electrical service	\$120,000
• Total	\$150,000